Gypsy Moth and Other Stresses on Oak Forests in the Huron-Manistee National Forests

- Objectives

1. Silvicultural Practices & Results

2. Lessons Learned

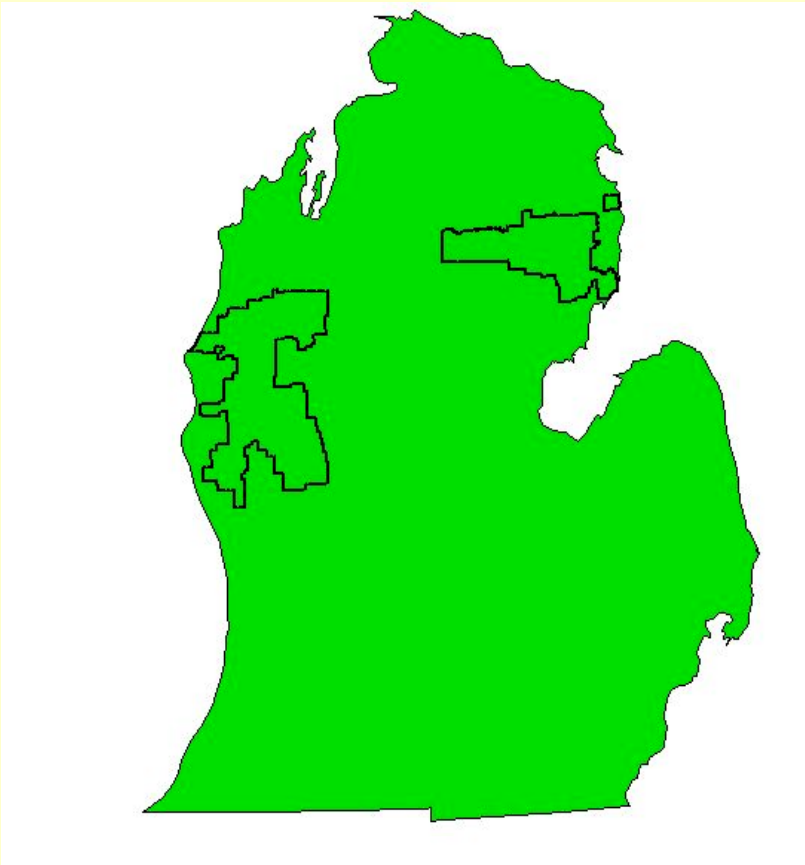
3. Management Recommendations

Outline of Presentation

- National Forests' location and ecological setting.
- Specific stress factors; controlled and uncontrolled.
- Forest cover types and ecological land type phases; oak mortality of natural and managed representatives.
- Summary; IPM and silvicultural prescriptions.

Huron – Manistee National Forests

975,00 acres National Forest land

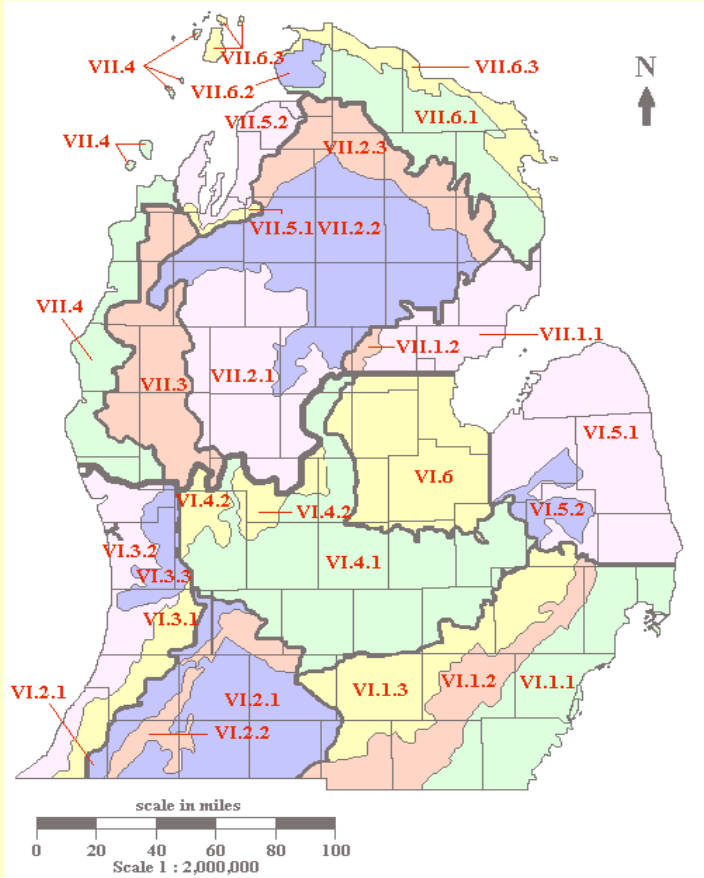


Manistee NF Ecological Settings

- Sandy outwash/ice-contact topography VII.3
- Sandy/loamy moraines VII.2.1
- Lake sand VII.4

Regional Landscape Ecosystems of Michigan's Lower Peninsula

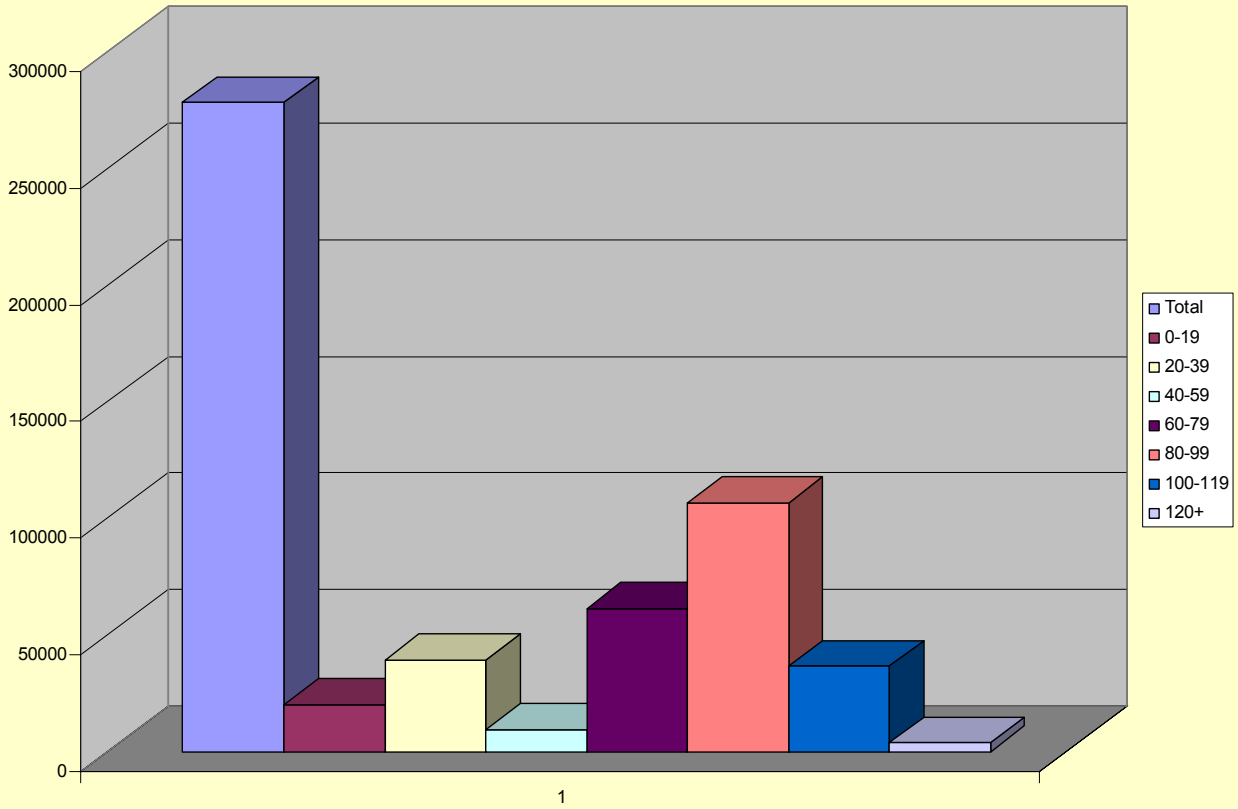
Source: Dennis Albert



Acres of All Oak Cover Types by 20 Year Age Class

Black, White, Northern Pin, Northern Red, Oak-Jack/Red Pine

278,000 acres



Drought

- 1988: No precipitation for 10+ weeks
- 1993 – 2003 : Significantly less annual precipitation Forest-wide
- Contributed to decline of root reserves

Armillaria spp.

- able to survive through adverse conditions
- primarily a secondary pathogen of weak trees
- colonizes and kills trees weakened by defoliation, insects, and drought

Photo credit: Tom Carver

Two-lined Chestnut Borer

- Low level populations on branches and weak trees
- Increases to epidemic levels following drought or insect defoliation

Photo credit: Robert A. Haack and Robert E. Acciavatti

ELTP: Black-white oak/vaccinium, excessively well drained sand on outwash plains

No harvest, light mortality

ELTP: Black-white oak/vaccinium on excessively well drained sand w/ sandy clay loam bands 1-3” thick on outwash plains

No harvest, moderate mortality

ELTP: Black-white oak/vaccinium, excessively well drained sand on outwash plains

No harvest, moderate jack pine and oak mortality

ELTP: Mixed oaks-red maple/starflower on excessively well drained sand w/ fine sand bands 1-3” thick on ice contact and overwashed moraines

No harvest, light mortality

ELTP: Black-white oak/vaccinium, excessively well drained sand on outwash plains

No harvest, heavy oak mortality

ELTP: Black-white oak/vaccinium, excessively well drained sand on outwash plains

Shelterwood harvest 1990, heavy oak mortality

ELTP: Black-white oak/vaccinium on excessively well drained sand w/ sandy clay loam bands 1-3” thick on outwash plains

No harvest, light mortality

ELTP: Mixed oaks-red maple/starflower on excessively well drained sand w/ fine sand bands 1-3” thick on ice contact and overwashed moraines

Thinned 1987, moderate mortality

ELTP: Mixed oaks-red maple/viburnum on well drained sand of ice-contact topography

Shelterwood harvest 1993, low mortality

ELTP: Mixed oaks-red maple/viburnum on well drained sand w/ coarse sandy loam bands 1-3” thick (C horizon) on sandy moraines and ice-contact topography

No harvest, light mortality

ELTP: Mixed oaks-red maple/viburnum on well drained sand w/ coarse sandy loam bands 1-3” thick (C horizon) on sandy moraines and ice-contact topography

Thinned 1988, light mortality

ELTP: Mixed oaks-red maple/viburnum on well drained sand w/ coarse sandy loam bands 1-3” thick (C horizon) on sandy moraines and ice-contact topography

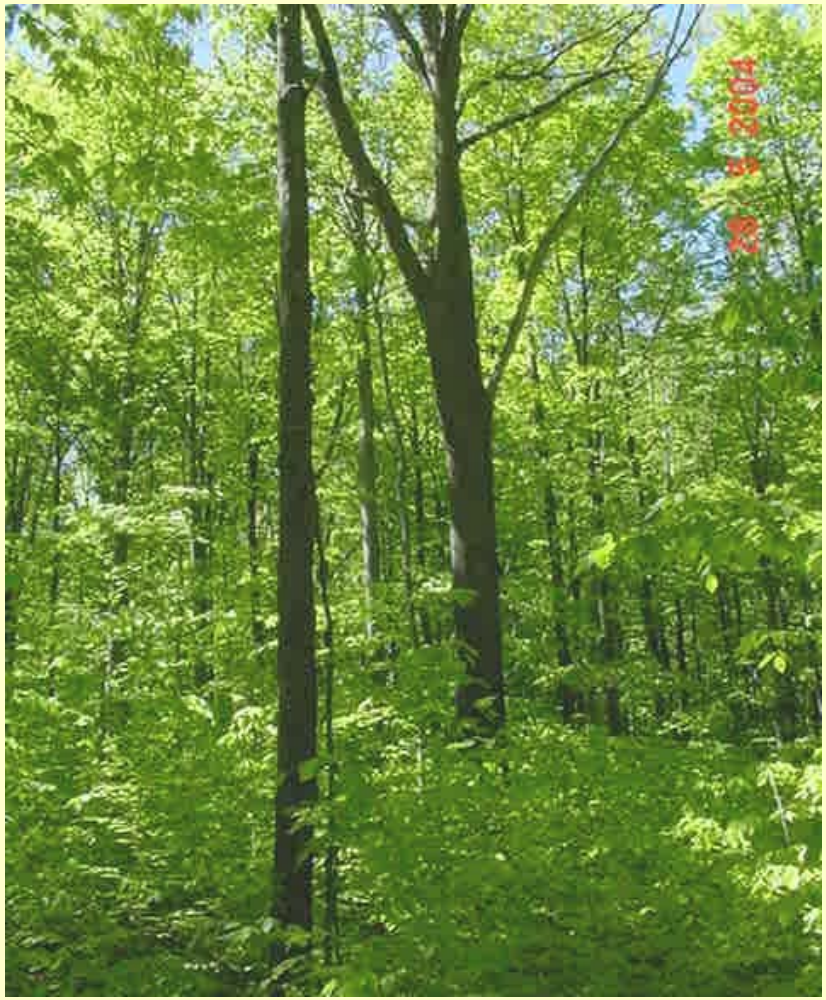
Thinned 1970, Bt spray 1991-1993, light mortality

ELTP: Mixed oaks-red maple/viburnum on well drained sand w/ sandy clay loam bands > 6” (B horizon, ortstein) of sandy moraines & ice-contact topography

No harvest, low mortality

ELTP: Sugar maple/beech/maianthemum on well drained sand on morainal sands

Thinned 1990, no mortality



ELTP: Sugar maple/beech/maianthemum on well drained sand w/ fine sand bands 1-3” thick (C horizon) on morainal sands

Thinned 1990, Bt spray 1991-1993, no mortality

ELTP: Sugar maple-red oak/maianthemum on well drained sand w/ fine sand bands 3-6” thick (C horizon) on morainal sands

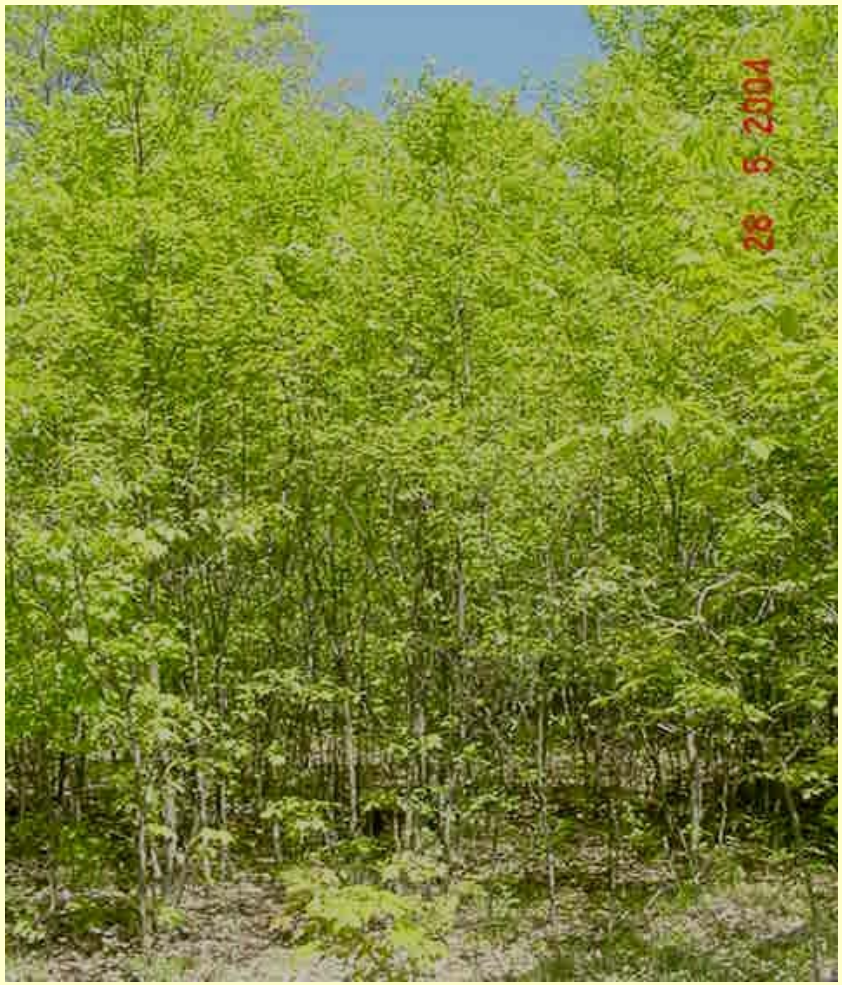
Thinned 1984, Bt spray 1992, light mortality

ELTP: Sugar maple-red oak/maianthemum on well drained sand w/ fine sand bands 3-6” thick (C horizon) on morainal sands

Thinned 1970, shelterwood 1985, Bt spray 1991-1993, light mortality

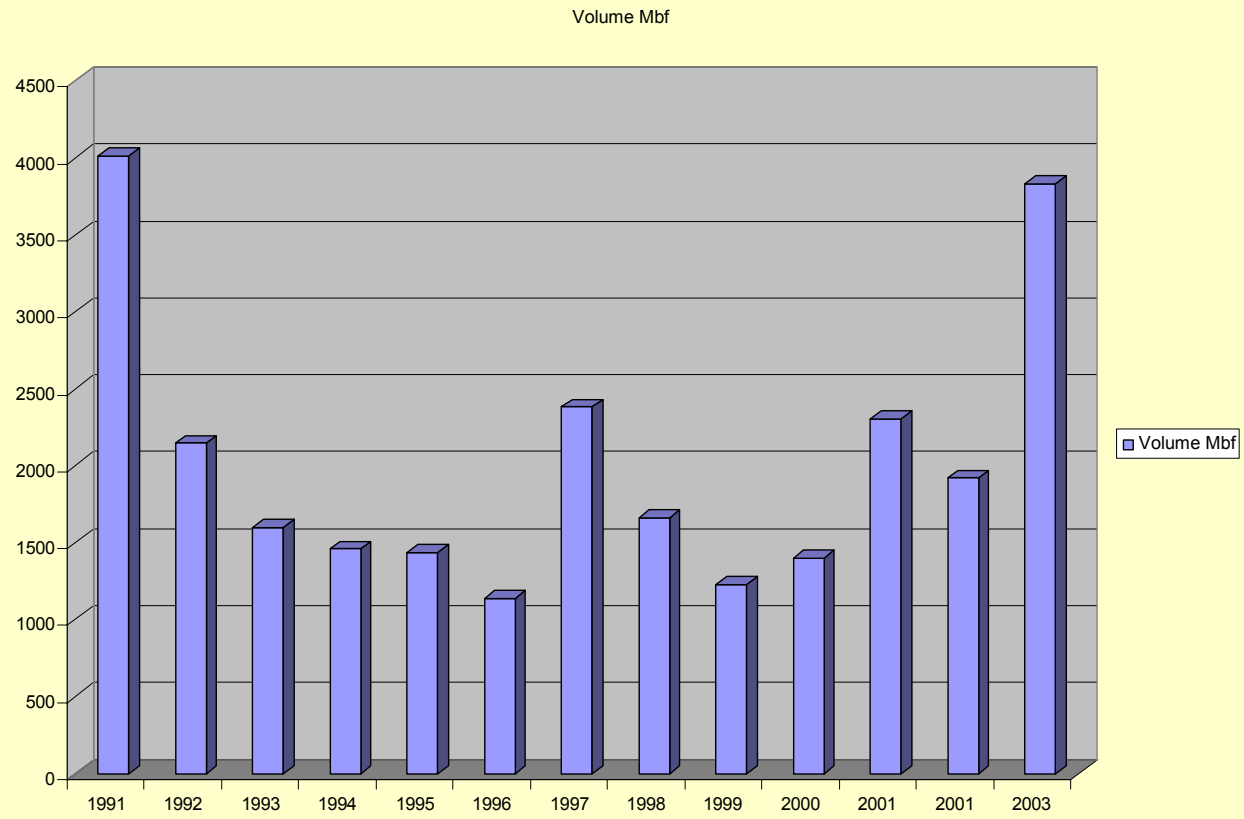
ELTP: Sugar maple-red oak/maianthemum on well drained sand w/ fine sand bands 3-6” thick (C horizon) on morainal sands

Overstory removal 1984, Bt spray 1992, moderate oak mortality in immature stand



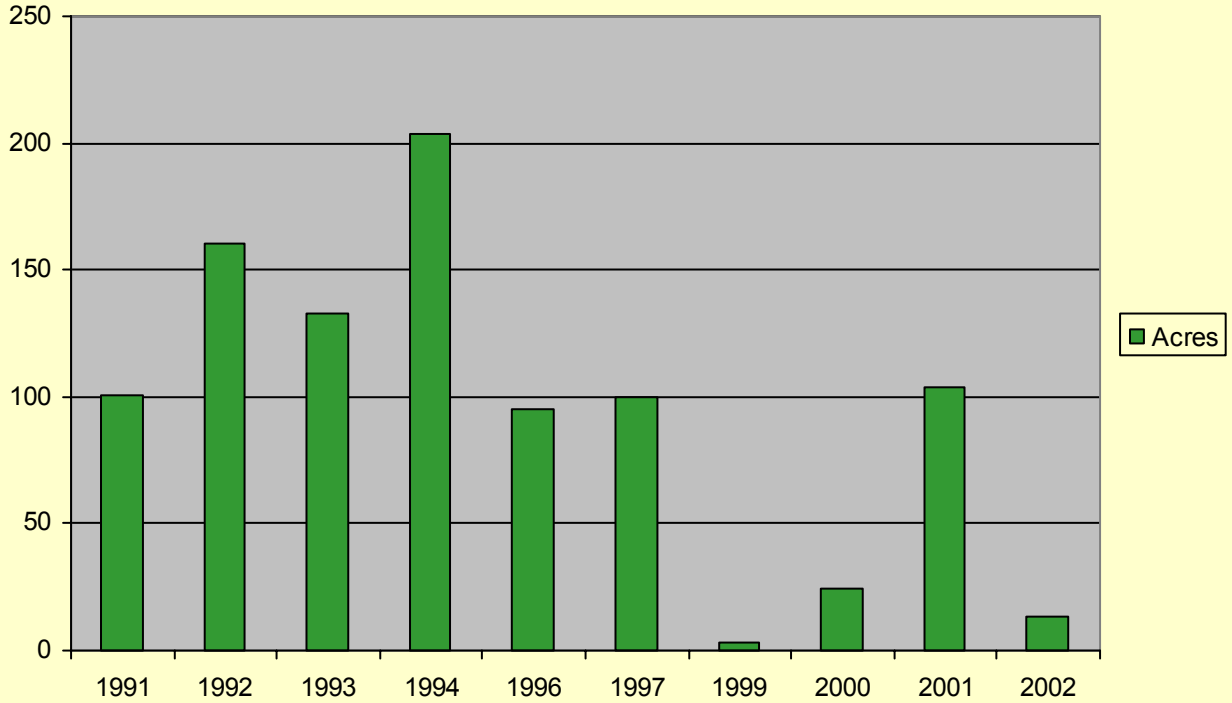
Volume (Mbf) of Charge Firewood Permits 1991 – 2003

Non-Commercial salvage of dead and down trees



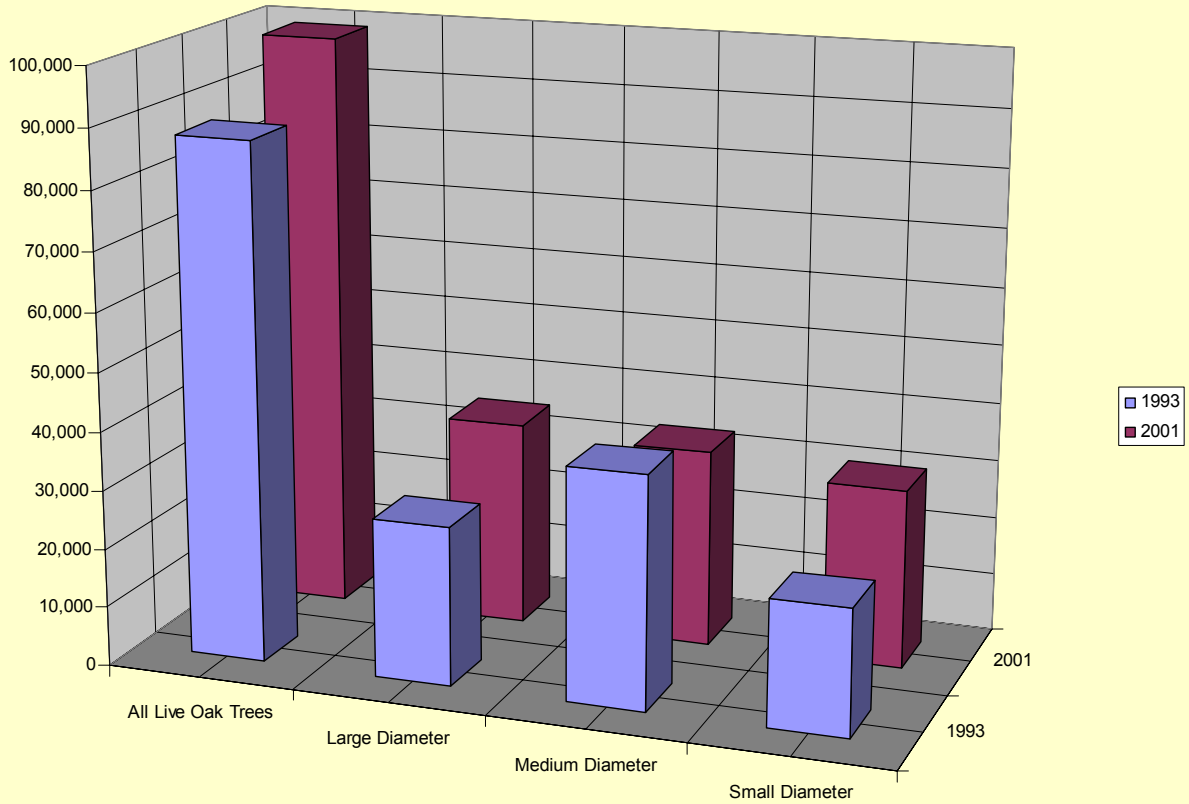
Acres of Oak Salvage 1991 – 2002

Upland Oak Cover Types
Commercial Thinnings and Clearcuts



Live Oak Trees 1993 and 2001

White, Black, Northern Pin, Northern Red in 11 0f 13 Counties, HMNF



Entomophaga maimaiga Fungus

Cadaver of a late instar gypsy moth filled with *Entomophaga maimaiga* resting spores. Note the remains of some of the conidia attached to larval hairs, the dried appearance of the cadaver, and the vertical position with head down. *Photo by D. Specker*

Nuclearpolyhedrosis Virus (NPV)

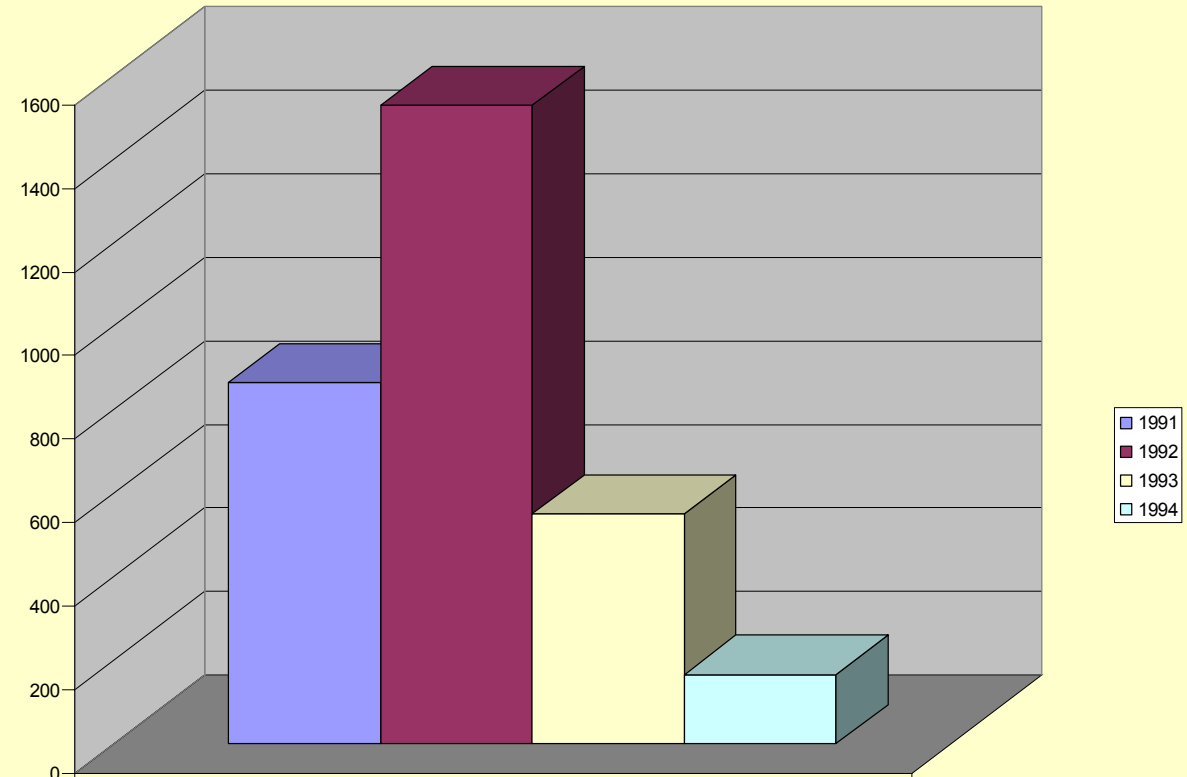
Cadaver of a late instar gypsy moth killed by NPV. Note the moist appearance of this older cadaver and inverted the "V" position. *Photo by D. Specker*

Gypsy Moth Egg Mass Surveys

- Protocol will vary from intensive count to 5-minute walk methods.
- Identify threshold values for treatment.
- Prioritize treatment areas.
- Tier to prior management decisions.

Bacillus thuringiensis (Bt) Applications

Acres on Manistee National Forest 1991 - 1994



	Acres
1991	864
1992	1528
1993	551
1994	166

Recommendations

1. Lower productivity sites have the greatest mortality. Develop alternative species and/or ecosystem treatments.

2. Moderate productivity sites have intermediate and variable mortality, depending on age class, stand structure, and stresses. Maintain overstory species diversity, and prepare for salvage harvests.

3. High productivity sites have the least mortality, and are able to fully recover when stresses subside. Aggressive egg mass surveys for potentially vunerable micro-sites.